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## Optical spectroscopy of Yb<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub> and Y<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub>: Yb<sup>3+</sup> and crystal-field parameters in rare-earth titanate pyrochlores

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### Abstract

Optical absorption spectra of the Yb<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub> single crystals and luminescence spectra of the Y<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub>:Yb (1%) polycrystalline samples were registered at temperatures 4.2-300 K. These spectra and earlier published data on magnetic properties of Yb<sup>3+</sup> ions and on the temperature dependence of the electric field gradient at Yb nuclei in Yb<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub> were used to analyze the crystal-field parameters in rare-earth titanates with the pyrochlore structure. The self-consistent sets of crystal-field parameters for rare-earth ions in the 16d sites with the D<sub>3d</sub> symmetry that describe satisfactory all known single-ion magnetic properties and low-energy excitations in R<sub>2</sub>Ti<sub>2</sub>O<sub>7</sub> crystals (R=Tb, Ho, Er, Tm, Yb) are presented.

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